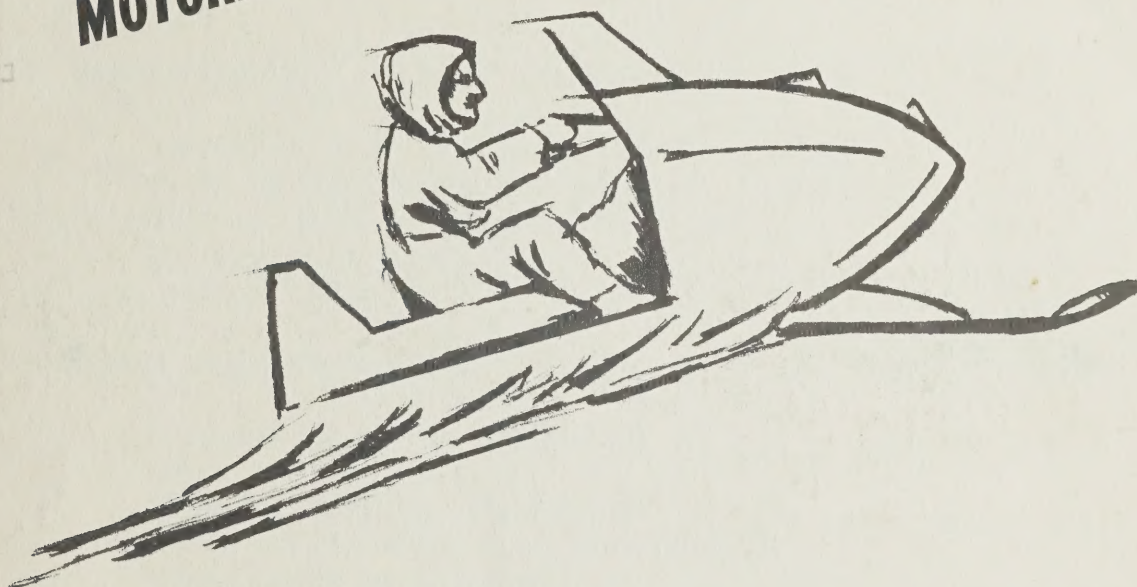


NOVEMBER 1968 — APRIL 1970

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General publications

MOTORIZED SNOW VEHICLE COLLISIONS



A Description and Analysis
Of Reported Collisions
Over Two Winter Seasons

Collision Records Unit
Safety and Environmental Studies Section
Ontario Department of Transport



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C O N T E N T S

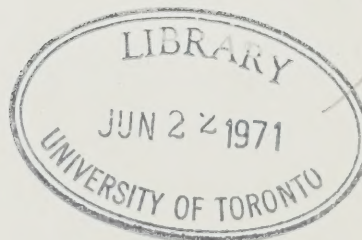
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DEFINITIONS

Snow Vehicle Traffic Collision - a collision involving a motorized snow vehicle with a moving or stopped motor vehicle on a highway.

Snow Vehicle Non-Traffic Collision - a collision involving a motorized snow vehicle with a parked motor vehicle or a fixed object on a highway or a collision involving a motorized snow vehicle only on a highway.

Off-Highway Collision - a collision involving a motorized snow vehicle which neither originates from nor results in impact on a highway.



SUMMARY OF FINDINGS

1. There are 323 official reports of collisions involving motorized snow vehicles: 288 occurred on highways, 35 off-highway.
2. There were 53 fatalities: 30 on highways, 23 off-highway.
3. Of the 288 highway collisions, 88 including 3 fatal collisions were known to occur on urban roads and 200 including 23 fatal collisions occurred on rural roads.
4. 86% (249/288) of all highway collisions occur in the travelled portion of the highway. 11% (32/288) occur on the shoulder. 2% involve collisions occurring in the residual area of the highway.
5. Seven of the 26 fatal collisions, and 65 of 183 injury collisions involved the snow vehicle impacting a motor vehicle parked either in the roadway or on the shoulder of the highway.
6. 119 of 286* highway collisions occurred during the week-end in hours of darkness.

* Condition or situation not known in all collisions

7. 79% (221/278) of highway collisions occurred on icy, packed snow, or dry surfaces. Only 47 occurred on a loose snow surface. 19 of the 26 fatal collisions occurred on icy or packed snow surfaces.
8. 14% (38/278) of highway collisions occurred during poor atmospheric visibility conditions caused by falling snow or sleet.
9. 36% (106/291) of snow vehicle operators in collisions were under 20 years of age; 12% were under 16 years of age and therefore driving illegally.
10. 22% (56/254) of snow vehicle operators 16 years or more of age did not hold a valid licence to operate any class of motor vehicle. Overall 32% (93/291) of all snow vehicle operators lacked formal experience with the operation of motor vehicles on the highway.
11. 20% (57/291) of the operators of the snow vehicles may not have been familiar with the operation of snow vehicles as judged by the fact that they neither owned nor did their immediate family own the snow vehicle. The vehicle was rented in only 5 cases.

12. 23% (62/272) of the snow vehicle operators for whom driver condition was stated were described as "ability impaired" or "had been drinking". In the case of fatal collisions in which driver condition was specified, 50% (12/24) involved a driver in this condition.

OVERVIEW

The recent rapid and continuing expansion of the use of motorized snow vehicles on highways throughout the Province has focussed attention on their collision experience and has raised concern over their safety of operation in the highway traffic system and about their future effect on road safety in general.

Official records of collisions occurring on highways over the last two winter seasons have been analysed to provide a general description of the nature and circumstances of snow vehicle crashes. These records were obtained from the Collision Records Unit*, the office of the Supervising Coroner and the office of the Registrar General and provided data on a total of 323 collisions involving motorized snow vehicles. Thirty-five of these records relate to off-highway collisions and 288 to highway collisions.

An attempt has also been made to identify factors or conditions related to the capability of drivers and the adequacy of the vehicles. Because of the seasonal nature of motorized snow vehicle activity particular attention was given to road surface, lighting and visibility factors in

*Safety and Environmental Studies Section
Department of Transport

the analysis of these collisions. Also the important recreational element in this activity leads to a special consideration of factors which would recognize this influence such as time and place of activity, as well as driver characteristics and condition.

A description and analysis of off-highway collisions is not provided in this report.

RECORDED MOTORIZED SNOW VEHICLE COLLISIONS IN ONTARIO
 NOVEMBER 1968 - APRIL 1970

| Severity of Collision | Type of Collision | | | Total |
|-----------------------------|---|---|------------------------------|-------|
| | On-Highway | | Off- Highway Collision | |
| | Snow Vehicle Traffic Collision | Snow Vehicle Non-Traffic Collision | | |
| Fatal | 15 | 11 | 22 | 48 |
| Personal Injury | 120 | 63 | 10 | 193 |
| Property Damage Only | 60 | 19 | 3 | 82 |
| | | | | |
| Persons Killed | 18 | 12 | 23 | 53 |
| Persons Injured | 157 | 75 | 11 | 243 |

CHARACTERISTICS OF SNOW VEHICLE COLLISIONS

Class of Road by Place of Occurrence

There were 189 collisions in Southern Ontario and 99 collisions in Northern Ontario. In Southern Ontario 42% (80/189) of all collisions occurred on township roads, 24% (45/189) occurred on urban roads and streets and 13% (25/189) occurred on county roads. (see Table 1, page 9)

In Northern Ontario 43% (43/99) of all collisions occurred on urban roads and streets and 23% (23/99) occurred on township roads. A further 21% (21/99) occurred on local roads within villages or smaller communities.

19 fatal collisions occurred in Southern Ontario and 7 occurred in Northern Ontario. 47% (9/19) of the Southern Ontario fatal collisions and 29% (2/7) of the Northern Ontario fatal collisions occurred on township roads.

TABLE 1: SNOW VEHICLE COLLISIONS BY CLASS OF ROAD, SEVERITY AND PLACE OF OCCURRENCE

| Class of Road | Northern Ontario | | Southern Ontario | | Total | |
|-------------------------|------------------|----------------|------------------|----------------|------------------|----------------|
| | Fatal Collisions | All Collisions | Fatal Collisions | All Collisions | Fatal Collisions | All Collisions |
| Urban Roads and Streets | 1 | 43 | 2 | 45 | 3 | 88 |
| Rural Roads | | | | | | |
| King's Highways | 2 | 7 | 2 | 17 | 4 | 24 |
| Secondary Roads | 1 | 4 | 2 | 4 | 3 | 8 |
| County Roads | - | 1 | 1 | 25 | 1 | 26 |
| Township Roads | 2 | 23 | 9 | 80 | 11 | 103 |
| Local Roads | 1 | 21 | 3 | 18 | 4 | 39 |
| All Roads | 7 | 99 | 19 | 189 | 26 | 288 |

Road Surface Type and General Visibility

The surface type and general atmospheric visibility are shown for the 278 collisions for which data was available in Table 2.

TABLE 2: MOTORIZED SNOW VEHICLE COLLISIONS
BY ROAD SURFACE TYPE AND VISIBILITY

| Road Surface Type | Visibility Good | Visibility Poor (Snow or Sleet)* |
|--------------------|--------------------|-------------------------------------|
| Icy or Packed Snow | 172 | 22 |
| Loose Snow | 33 | 14 |
| Dry | 26 | 1 |
| Wet | 9 | 1 |
| Totals | 240 | 38 |

*Includes one collision during rain condition and 3 collisions during fog condition.

79% (221/278) of the collisions occurred on icy, packed snow or dry surfaces.

Poor visibility due to snow or sleet conditions was indicated in 14% (38/278) of the collisions.

Road surface information was available for 23 of the 26 fatal collisions reported on highways. In 19 such cases collision

occurred on an icy or packed snow surface.

Day of the Week and Light Condition

Table 3 shows the distribution of the collisions in terms of light condition and day of week.

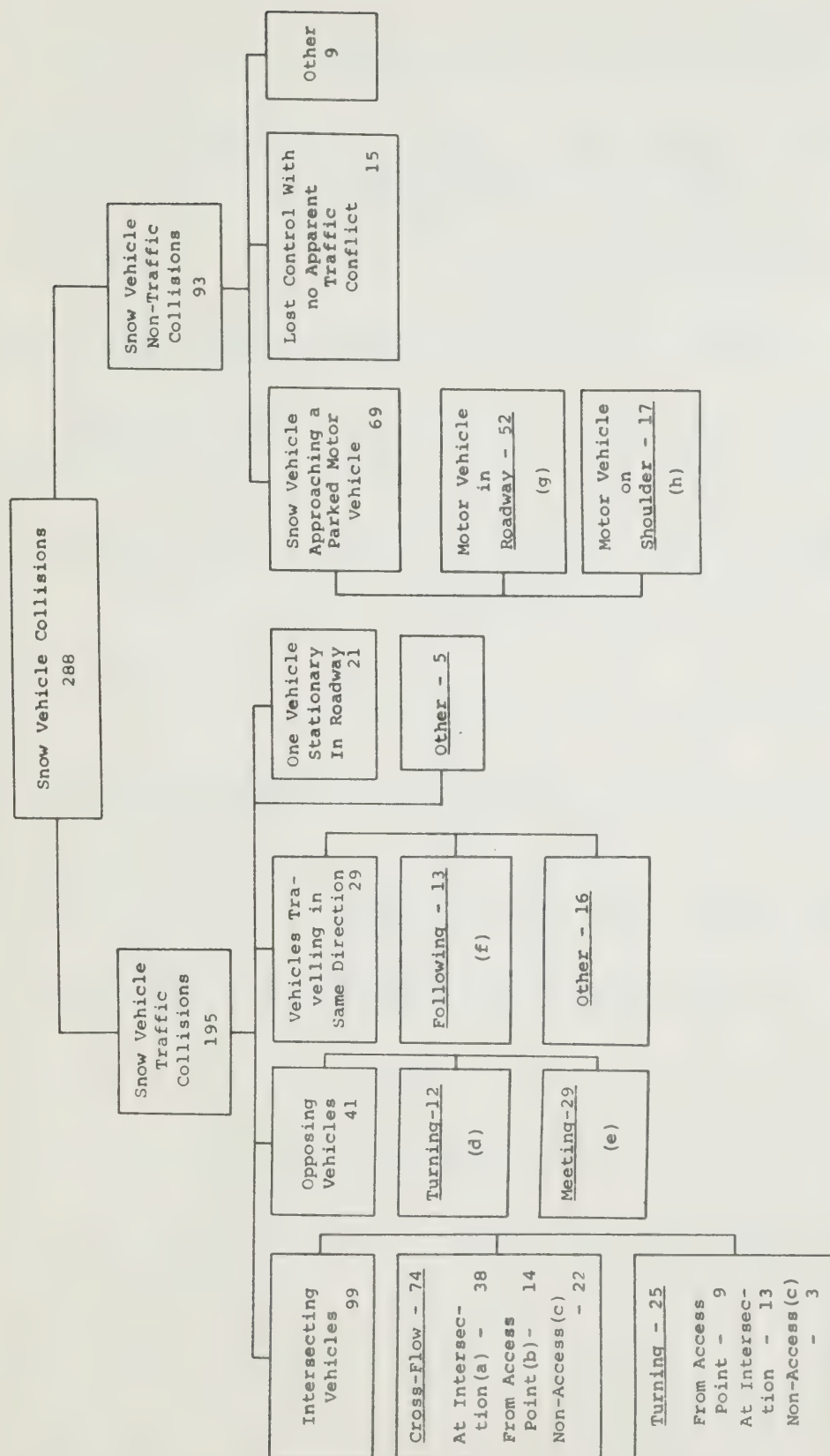
TABLE 3: LIGHT CONDITION AND DAY OF WEEK

| Light Condition | Day of Week | |
|-----------------|-------------|---------|
| | Weekday | Weekend |
| Daytime | 46 | 58 |
| Dark | 63 | 119 |

*Weekend includes the period from 6 p.m. Friday to 12 midnight Sunday. This period includes approximately 24 hours of daylight and 30 hours of darkness.

It can be seen that weekend night-time is associated with 119/286 of the collisions (42%) and that weekend collisions account for 61% (177/288) of all snow vehicle collisions occurring on highways.

Figure 1: DIRECTIONAL ANALYSIS OF SNOW VEHICLE COLLISIONS, 1968-70



- (a) In 7 cases it was stated that snow banks were a contributing factor obstructing the line of vision. In four other cases snow banks were indicated on collision diagrams.
- (b) One case stated snow banks obscured vision, 1 case where snow blowing from snow banks obscured vision and 1 case where hedge obscured vision.
- (c) Snow vehicle crosses road directly from field, ditch or trail.
- (d) Snow vehicle attempts turn across motor vehicle in eight cases. In three cases snow vehicle had been travelling wrong way on shoulder or in ditch prior to entering roadway.
- (e) Snow vehicle is reported on the wrong side of road or wrong shoulder in 20 cases.
- (f) Motor vehicle rear-ends snow vehicle in 8 cases, 5 at night.
- (g) 51 cases occurred at night. In 15 cases the collision report stated that the snow vehicle driver had failed to see the motor vehicle.
- (h) Thirteen cases occur at night.

Directional Analysis

An analysis of collisions in terms of the reported direction of travel of the motorized snow vehicles and motor vehicles involved is provided in Figure 1.

The major categories of traffic collision which emerge from this analysis are "intersecting vehicles" and "opposing direction of travel". In the non-traffic group the predominant categories are "snow vehicle approaching a parked vehicle" and "lost control with no apparent traffic conflict".

Impact Location

An examination of the reported point of impact indicates that 86% (249/288) of collisions occur in the travelled portion of the highway (Table 4). 32 of 288 occur on the shoulder of the highway; 7 of 288 involve collisions in the residual area of the highway.

TABLE 4: IMPACT LOCATION BY COLLISION TYPE AND SEVERITY

| Point of Impact | Severity of Collision | | | Total |
|-------------------------------------|-----------------------|-----------------|----------------------|-------|
| | Fatal | Personal Injury | Property Damage Only | |
| Snow Vehicle Traffic Collisions | | | | |
| Roadway | 14 | 112 | 54 | 180 |
| Shoulder | 1 | 7 | 4 | 12 |
| Residual* | - | 1 | 2 | 3 |
| Snow Vehicle Non-Traffic Collisions | | | | |
| Roadway | 7 | 49** | 13 | 69 |
| Shoulder | 3 | 13 | 4 | 20 |
| Residual | 1 | 1 | 2 | 4 |

* The portion of a highway that does not include the roadway or shoulders.

** Three collisions involve collision between motorized snow vehicles.

DRIVER CHARACTERISTICS

Sex and Place of Residence

91% of the snow vehicle drivers involved in collisions were males and 99% were Ontario residents. Fourteen of 19 fatally injured snow vehicle drivers resided in rural areas or places with populations under 10,000.

Age

A notable characteristic of these snow vehicle drivers was their youth. The proportion of snow vehicle drivers under 20 years of age was 36% (106/291) overall (Table 5). An appreciable fraction (12%) were under 16. These youngest drivers tend to be involved largely in traffic collisions probably due to their lack of judgment and formal experience with highway traffic.

Highway Traffic Experience

It was assumed that an important aspect of the risk of involvement in collisions was the snow vehicle operator's familiarity with rules of the road and driving a motor vehicle in traffic. Searches were made of driver licence records for all snow vehicle operators over the age of 15. Persons who were found to have had a driver's licence at or prior to the time of collision were considered to have had such familiarity.

TABLE 5 : SNOW VEHICLE DRIVERS BY COLLISION TYPE,
AGE AND LICENCE HISTORY

| Collision Type and Licence Status | Age Groups | | | | | All Ages |
|---|-------------|-------|-------|-----|--------------|-------------|
| | Under 16 | 16-19 | 20-24 | 25+ | Not Known | |
| Snow Vehicle Traffic Collisions | | | | | | |
| Licensed ¹ | - | 35 | 25 | 68 | - | 128 |
| Not Licensed ² | 31 | 16 | 8 | 10 | 1 | 66 |
| Snow Vehicle Non-Traffic Collisions | | | | | | |
| Licensed | - | 14 | 16 | 40 | - | 70 |
| Not Licensed | 4 | 6 | 7 | 9 | 1 | 27 |
| All Collisions | | | | | | |
| Licensed | - | 49 | 41 | 108 | - | 198 |
| Not Licensed | 35 | 22 | 15 | 19 | 2 | 93 |

1. Departmental records indicated possession of a driver's licence at or prior to time of collision.
2. Driver stated or no licence record match obtained.

22% (56/254) of snow vehicle operators 16 years or over apparently had never held a licence to operate any class of motor vehicle (Table 5). This proportion is similar to the expected value (17%) based on the licensing characteristics of Ontario males over 16.

A lack of formal experience in the operation of motor vehicles on the highway is indicated for 32% (93/291) of all snow vehicle operators involved in collisions.

Familiarity with Snow Vehicles

A further influence on the risk of collision involvement is the operator's familiarity with the snow vehicle. Greater familiarity is assumed where the snow vehicle was owned by the operator or his family than if it was not so owned.

20% (57/291) of the snow vehicle operators involved in collisions neither owned nor did members of their immediate family own the snow vehicle they were riding. To the extent that ownership is an acceptable measure of familiarity with the task of snow vehicle operation it is likely therefore that these vehicles were being used by relatively unskilled operators.

Occurrence of Alcohol

Table 6 indicates that 23% (62/272) of the snow vehicle operators for whom driver condition was stated were identified as ability impaired or had been drinking. For snow vehicle non-traffic collisions, the corresponding proportion 42% (36/85) is even higher. In the case of fatal collisions in which snow vehicle driver condition was specified, 50% (12/24) indicated alcohol.

TABLE 6 : REPORTED ALCOHOL CONDITION

| Collision Type | Alcohol | No Alcohol | Not Stated | Total |
|------------------------------------|---------|------------|------------|-------|
| All Collisions | 62 | 210 | 19 | 291 |
| Snow Vehicle Traffic Collision | 26 | 161 | 7 | 194 |
| Snow Vehicle Non-Traffic Collision | 36 | 49 | 12 | 97 |
| Fatal Collisions | 12* | 12 | 3 | 27 |

* Post-mortem blood alcohol concentrations were available for 6 of the 12 snow vehicle drivers. In one case the level was 0.13% and in five cases the level exceeded 0.17% by weight.

ENFORCEMENT OF TRAFFIC LAWS

Charges Laid

For the 69-70 winter season there were a total of 123 charges reported, either against the snow vehicle operator or the owner. Charges were laid against 53% of the snow vehicle operators in highway collisions. The number of charges laid against individuals ranged from a minimum of one (in the majority of cases) to a maximum of four.

TABLE 7: CHARGES LAID AGAINST SNOW VEHICLE
OPERATORS AND/OR OWNERS

| Nature of Charge under the Motorized Snow Vehicles Act (except as noted) | Number |
|--|--------|
| Rules of the Road | 60 |
| Vehicle Registration | 39 |
| Driving Under Age | 16 |
| Driver Condition* | 3 |
| Prohibited Driving on King's Highway | 3 |
| Not Specified (Charges Pending) | 2 |
| TOTAL | 123 |

*Charges laid under the Criminal Code of Canada

